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Research Article

Health Information System Users in Public Health Facilities: A Descriptive Analytics

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ABSTRACT

Health Information Systems (HIS) are vital in making or developing the policies of health programs in the Philippines. The HIS is broadly defined as a system that integrates data collection, processing, reporting, and use of the information necessary for improving health service effectiveness and efficiency through better management at all levels of health services. This study is conducted to visualize the current situation of the health information system users in public health facilities in the Province of Bataan. It endeavors to answer on how the health facilities in the Province are described based on their report platform, the number of personnel, trained and untrained per facility, and the needs of the facilities when it comes to the training of the encoders. The researchers used the descriptive method specifically the Dashboarding, Analysis, and Reporting or DAR method for this study. This study focused on the data gathered from the Health Information Systems Assessment Tool. The assessment was conducted with 24 different health facilities in the Province of Bataan. The study revealed that 14 out of 24 (58%) of the Rural Health Units (RHUs) in the Province of Bataan used paper-based reporting while 10 out of 24 (42%) of the RHUs used a health information system. Twenty one out of 48 encoders (44%) are untrained while 27 out of 48 (56%) are trained. Capability training in each health information system used is proposed. In conclusion, the Province of Bataan is supporting the implementation of the use of health information systems (HIS) by designating encoders for every public health facility.

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Keywords: *Health information system, Public health facilities, Philippines*

Introduction

In our everyday life, health is the most important thing, especially now that we are in the middle of the COVID-19 pandemic. The whole world focuses on how to control the virus, but the health authorities did not see the effect in other health programs. In the Philippines, we have health programs that are set aside because of the pandemic, one is the implementation of the health information systems (HIS). What are health information systems? The HIS is broadly defined as a system that integrates data collection, processing, reporting, and use of the information necessary for improving health service effectiveness and efficiency through better management at all levels of health services. It encompasses all health data sources including health facility and community data; electronic health records for patient care; population-based data; human resources information; financial information; supply chain information; and surveillance information, along with the use and communication of this information (United Nations Development Programme, Capacity Development for Health, 2021). The use of information and communication technology (ICT) in health or e-health will address two challenges in the health sector, namely, equitable access to health care services especially those in geographically isolated and disadvantaged areas (GIDA), and access to quality real-time information for informed decision-making. It will cover priority areas in health information systems, electronic medical records in various health facilities, and the use of telemedicine (DOH Information Systems Strategic Plan, 2018 - 2020). This study endeavors to continue what has been formally started in the past years, which is aligned with the Philippines Health Agenda 2016-2022 (PHA). The undertakings of the Department of Health (DOH) monitoring and evaluation and data governance group, and inter-agency governance structure of the national eHealth program, and current data harmonization activities with the Philippine Health Insurance Corporation (PhilHealth) bring about the implementation of similar or comparable systems that address the commitments of the PHA 2016-2022 and more specifically the implementation of systems interoperability of various eHealth applications and health information systems and addresses the data needs of the DOH, Philhealth, and other stakeholders. The implementation of electronic medical records in all primary care facilities and government hospitals which one of the promised DOH for Municipal/City Health Officers. A Philippine Health Information Exchange (PHIE) which is a system and infrastructure for secured patient data exchange among providers, and insurers and for the production of service statistics will be further established. Thus, expanding coverage of the electronic medical record (EMR) and health information system for primary care facilities, in particular Integrated Clinic Information System (iClinicSys), and for hospitals, Integrated Hospital Operation Management Information System (iHOMIS) give importance. The EMRs at the point of care feed to the PHIE with an initial use case of primary care benefit of Philhealth but other use cases soon. Additional Philhealth benefit packages will be incorporated and the disease registries that are currently vertically implemented if not included in the iClinicSys or iHOMIS. The integration of telehealth device(s) to iClinicSys or iHOMIS shall also be prioritized. The other direct health service delivery systems are the expanded implementation of the blood banking systems in blood centers, and treatment and rehabilitation centers' health records. For regulatory services, these will include the integration of existing modules or systems and the development of an expanded system on health facilities and services licensing, revision of drug testing operations, and international health regulation. The health emergency management service system will be enhanced and deployed further to regional offices and hospitals. There will also be expansion and scaling up of implementation of the disease surveillance systems, and appli-

cations on environmental health services, organ donation, Health Human Resources (HHR), and telemedicine. Support to operations systems implementation will be continued in the areas of financial, procurement, logistics and personnel management, and international health coordination activities and information management (DOH (2017, May), Information System Strategic Plan 2018-2022)). The use of health information systems in various parts of the Philippines is contributing to the DOH developing plans and strategies for strengthening the country's health programs. This study will focus on the analysis of the health information system users in public health facilities that are used in the Province of Bataan.

Review of Related Literature

According to the United Nations Development Programme Capacity Development for Health (UNDP-CDH), The UN Sustainable Development Goals set an ambitious agenda for a healthier world. Achieving the goals will require reliable data, understanding the scale of the work to be done, and making good decisions on health priorities and how to allocate resources for the most efficient and effective results. A well-functioning health information system is essential for the collection and generation of quality data to inform on time all relevant stakeholders for planning, review, program monitoring, and overall quality assurance and improvement of all aspects of the health system. Attaining these goals will require investments in robust health information systems.

In many countries, the quality of data gathered at health facilities and the capacity to analyze and use this data remain inadequate to support decision-making that will accelerate Universal Health Coverage. WHO health system strengthening stresses the need to support countries to strengthen their health information systems (HIS), which provide reliable information on which to base program decisions, support the development of solid national health policies, strategies and plans and contribute to reliable procurement and supply of health products through accurate data on needs and usage. The purpose of HIS is to produce and organize information and knowledge generated and used in the healthcare area to support the planning, improvement, and decision-making process of the multiple actors involved in related processes (Lippeveld, Sauerborn & Bodart, 2000). The use of HIS can improve not only the health of individuals but also the performance of healthcare providers, providing increased levels of quality, financial efficiency, and greater participation of patients in the care of their health (Blumenthal & Tavenner, 2010).

Several acronyms have emerged over time to designate electronic HISs, such as electronic health record (EHR), electronic medical records (EMR), health information exchange (HIE), computerized physicians order entry (CPOE), hospital information system, and telemedicine/telehealth/e-health (Blumenthal, DesRoches, Donelan, Rosenbaum & Ferris, 2006; Jha, Doolan, Grandt, Scott & Bates, 2008; Rosenthal, Seeman & Gibson, 2005; Lakbala & Dindarloo, 2014; Petroudi & Giannakakis, 2011; Spil, LeRouge, Trimmer & Wiggins, 2009). Considering the national scope of implementation of such technologies, this sort of venture comprises the government definition of policies and standards that encourage the convergence of public and private interests in the development of an effectively functional national system (Coiera, 2009). Coiera (2009) still proposes a typology for regulatory models of implementation of large-scale HIS (top-down, middle-out, bottom-up), categorizing them according to the level of influence of government authority and the level of autonomy experienced by provider institutions in the process of developing, implementing and using the systems. While the top-down approach is characterized by centralized management accomplished by the government, in the bottom-up approach the health care institutions make their own decisions about the system to be implemented, following the minimum interoperability standards. In an intermediate way, the middle-out approach combines elements of the other two approaches (Coiera, 2009, Morrison *et al.*, 2011). The implementation of electronic HISs at the national level has been considered a complex process full of challenges. Technical,

human, social, and organizational problems are frequently reported, which compromise the efficiency and effectiveness of these initiatives, which – in turn – involve several interested parties necessary for the success of the implementation.

Conceptual Framework

The diagram represents the underlying theoretical interpretation of the researchers' process to gather data for the analysis of the health information system users in public health facilities in the Province of Bataan.

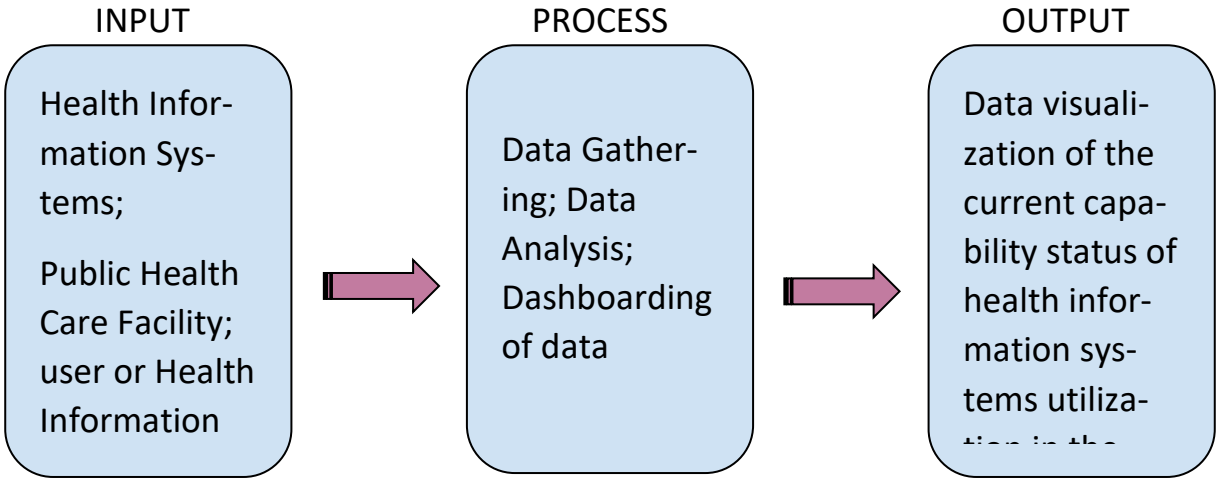

Figure 1.0. Conceptual Framework of the Public Health Information System Descriptive Analysis in the Province of Bataan

Methods

This study was conducted by the World Citi Colleges students who are taking up Masters in Public Administration S.Y. 2022 - 2023. The aim of this research is to visualize the health information system users in public health facilities in the Province of Bataan.

The researchers used the Dashboarding, Analysis, and Reporting or DAR method for this study. This study focuses on the data gathered from the Health Information Systems assessment tool.

The researchers used Microsoft Power BI for dashboarding and to visualize the data gathered in this study. This visualization helps the researchers to determine the gaps and analyze the use of different Health Information Systems in the Province of Bataan.

In this study, there were 19 Rural Health Units, 3 City Health Centers, 1 Memorial Hospital, and 1 District Hospital that participated in the assessment conducted by the DOH.

Table 1. Types of Facilities in the Province of Bataan

Type of Health Care Facility	No. of Health Care Facility	Percentage (%)
Rural Health Units	19	79.17%
City Health Centers	3	2.20%
Memorial Hospitals	1	1.17%
District Hospital	1	1.17%
Total	24	100%

The researchers selected the Province of Bataan for this study for the assessment of the HIS for the reason that the Province has the most rolled out health information systems, and the first province who signed the Memorandum of Understanding for the assessment of HIS for the sentinel site project.

The questionnaire is the main research instrument that will answer all the objectives of the study as stated in the section of the statement of the problem. The instrument used in this study is the Health Information System Capacity Assessment Tool (v1.0) which was developed by the Department of Health (DOH). The first part of the instrument used includes the general information about the Health Care Facility, the second part was the questions to be answered by the representative of the Health Care Facility and the third part which is the last part includes the information of the encoders in the Health Care Facility.

In this Study the researchers requested the data from the ongoing Sentinel Site project of DOH-DPCB for the integration of Health Information Systems in the Philippines. The data was requested via Freedom of Information (FOI) request to the respected offices in the DOH. The Disease Prevention and Control Bureau - Partnership and Data Management Division (DPCB-PDMD), the office for the Sentinel Sites project gave the actual assessment result and that was filled out by the respondent. All sensitive information was covered to observe the R.A. 10173 also known as the Data Privacy Act of 2012.

The researchers used the data collected during the assessment of the utilization of health information systems in the public health facilities in the Province of Bataan for the integration of the health systems sentinel site project of the department of health.

The assessment questionnaire was answered and submitted by the public health facilities heads or the lead encoder. The assessment questionnaire was sent to the center for health development (regional) and cascaded to the province and local authorities via email/viber/facebook messenger and then the respondent sent it back to the department of health central office.

The answers of the respondents were collected during the assessment of the utilization of health information systems in the public health facilities in the Province of Bataan for the integration of the health systems sentinel site project of the Department of Health.

For the treatment of data, the researchers used the data submitted by the respondents to develop a data dashboard that can visualize the current capability status of utilization of Health Information Systems in the Province of Bataan.

Results and Discussion

The data obtained from the respondents was used to develop a data dashboard that can visualize the current capability status of utilization of Health Information Systems in the Province of Bataan.

1. How may the Health Information System of the Rural Health Unit be described in terms of:
   1.1 using paper-based reporting?
   1.2 using a health information system?

Table 2. Data reporting modalities

Type of Reporting	No. of Health Care Facility	Percentage (%)
Paper-based	14	58%
Through HIS	10	42%
Total	24	100%

This table shows the health facilities that are using paper-based reporting and the facilities that report electronically through HIS. There are a total of 24 public health facilities in the Province of Bataan and 14 *(58%)* of which are using paper-based reporting and 10 *(42%)* are reporting electronically through the HIS.

2. How may the encoder of the health information system be assessed based on:
   2.1. trained?
   2.2. not trained?

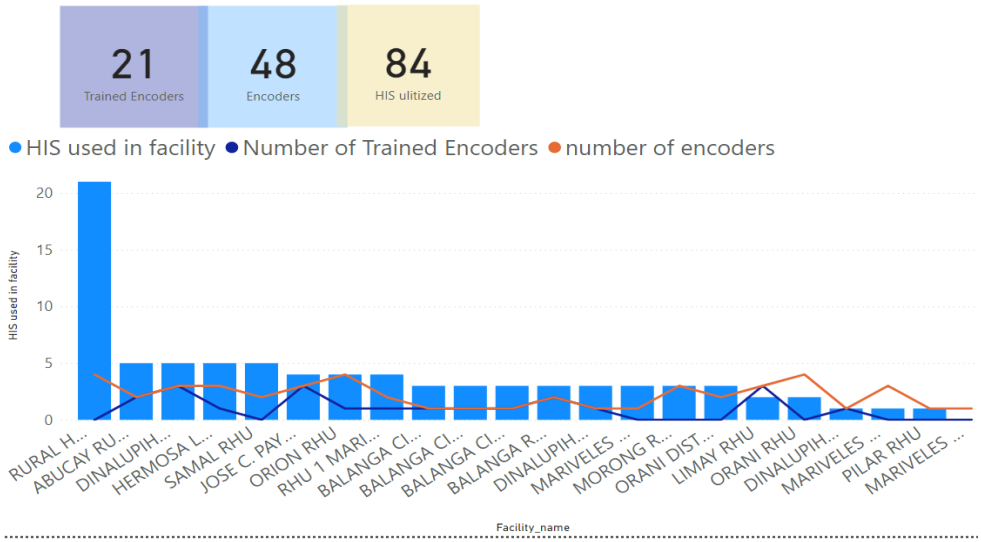

Figure 2. Overall data of the Province of Bataan public health facilities, capability of encoders, and Health Information Systems utilized.

This figure shows the number of encoders, trained and untrained, who use the HIS in public health facilities in the Province of Bataan. It also shows the number of HIS utilized in each public healthcare facility in the Province of Bataan. There are a total of 48 encoders. Twenty seven *(44%)* of them are untrained to use the HIS and only 21 *(56%)* are trained.

The following figures are the demographic profile of each public health facility in the Province of Bataan:

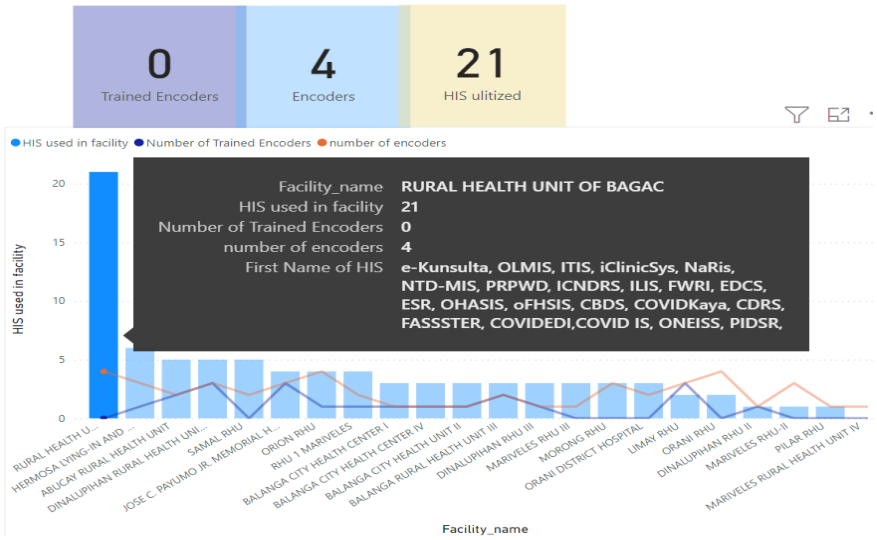

Figure 3. Rural Health Unit of Bagac

In this graph, it shows that the number of Health Information Systems (HIS) used in the Rural Health Unit of Bagac is 21, with 4 encoders and 0 trained encoders. The Health Information Systems used were e-Konsulta, OLMIS, ITIS, iClinicSys, NaRis, NTD-MIS, PRPWD, ICNDRS, ILIS, FWRI, EDCS, ESR, OHASIS, ofHSIS, CBDS, COVIDKaya, CDRS, FASSSTER, COVIDEDI, COVID IS, ONEISS and PIDSR.

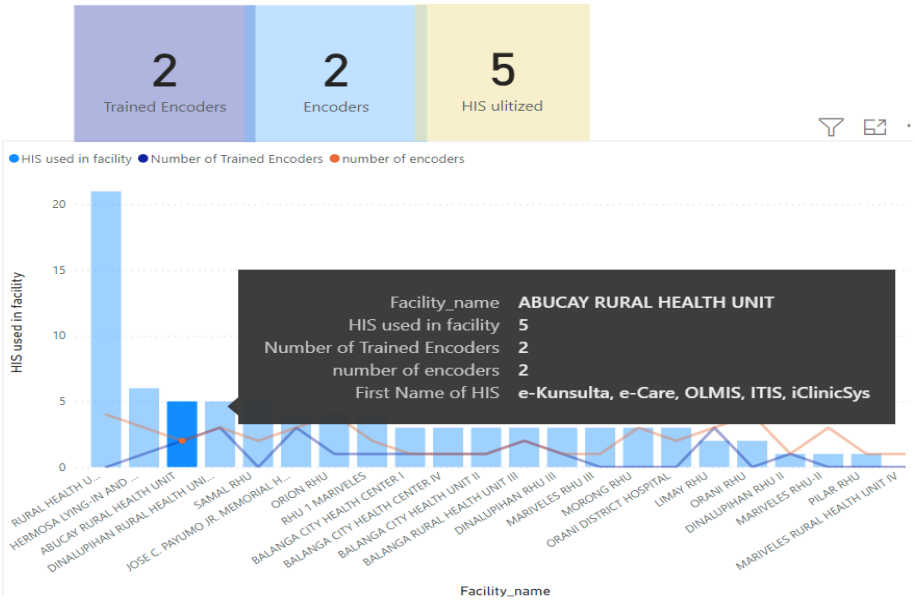

Figure 4. Abucay Rural Health Unit

In this diagram, it shows that the number of Health Information Systems (HIS) used in the Abucay Rural Health Unit is 5, with 2 encoders and 2 trained encoders. The Health nformation Systems used were e-Konsulta, e-Care, OLMIS, ITIS and iClinicSys.

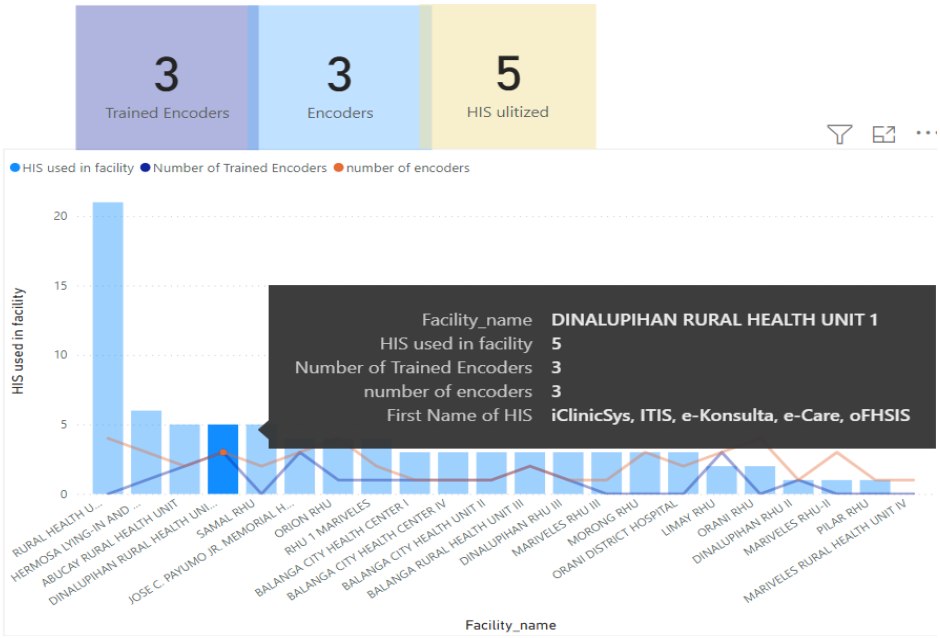

Figure 5. Dinalupihan Rural Health Unit 1

In this representation, it shows that the number of Health Information Systems (HIS) used in the Dinalupihan Rural Health Unit 1 is 5, with 3 encoders and 3 trained encoders. The Health Information Systems used were iClinicSys, ITIS, e-Konsulta, e-Care and ofHSIS.

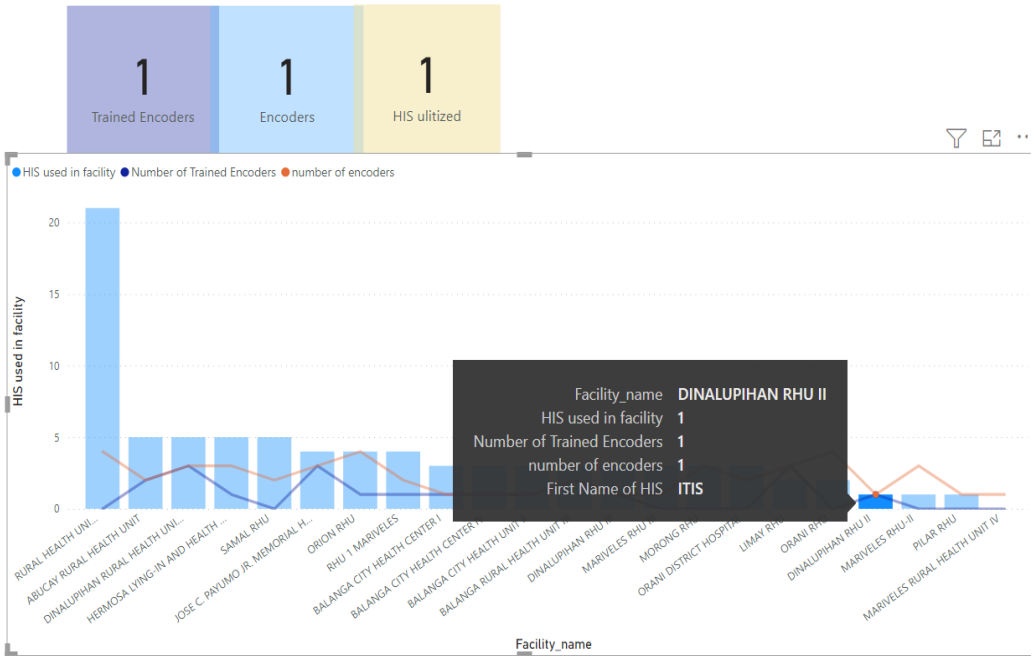

Figure 6. Dinalupihan Rural Health Unit 1I

In this illustration, it shows that the number of Health Information Systems (HIS) used in the Dinalupihan Rural Health Unit II is 1, with 1 encoder and 1 trained encoder. The Health Information Systems used is ITIS.

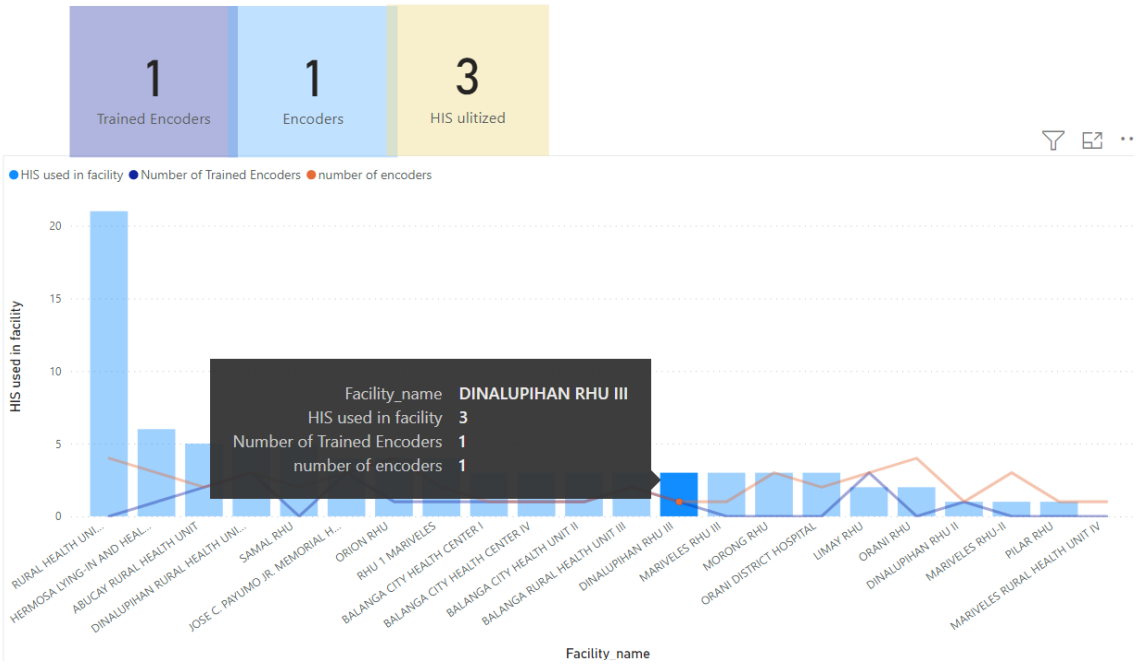

Figure 7. Dinalupihan Rural Health Unit III

In this figure, it shows that the number of Health Information Systems (HIS) used in the Dinalupihan Rural Health Unit III is 3, with 1 encoder and 1 trained encoder.

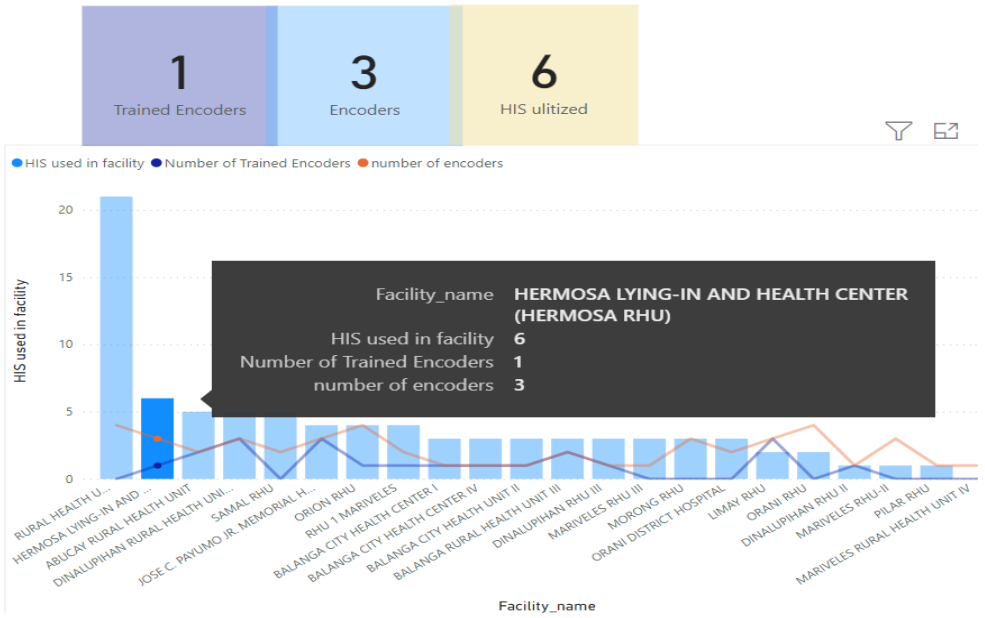

Figure 8. Hermosa Lying-In and Health Center (Hermosa Rural Health Unit)

In this graph, it shows that the number of Health Information Systems (HIS) used in the Hermosa Lying-In and Health Center (Hermosa RHU) is 6, with 3 encoders and 1 trained encoder.

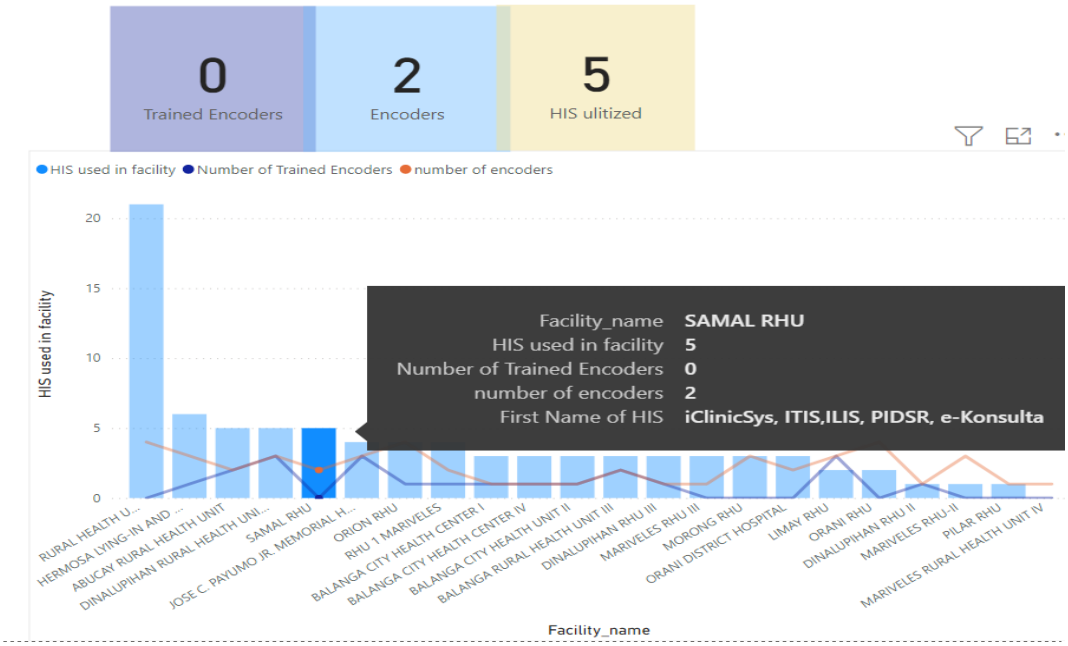

Figure 9. Samal Rural Health Unit

In this diagram, it shows that the number of Health Information Systems (HIS) used in the Samal Rural Health Unit is 5, with 2 encoders and 0 trained encoders. The Health Information Systems used were iClinicSys, ITIS, ILIS, PIDSR and e-Konsulta.

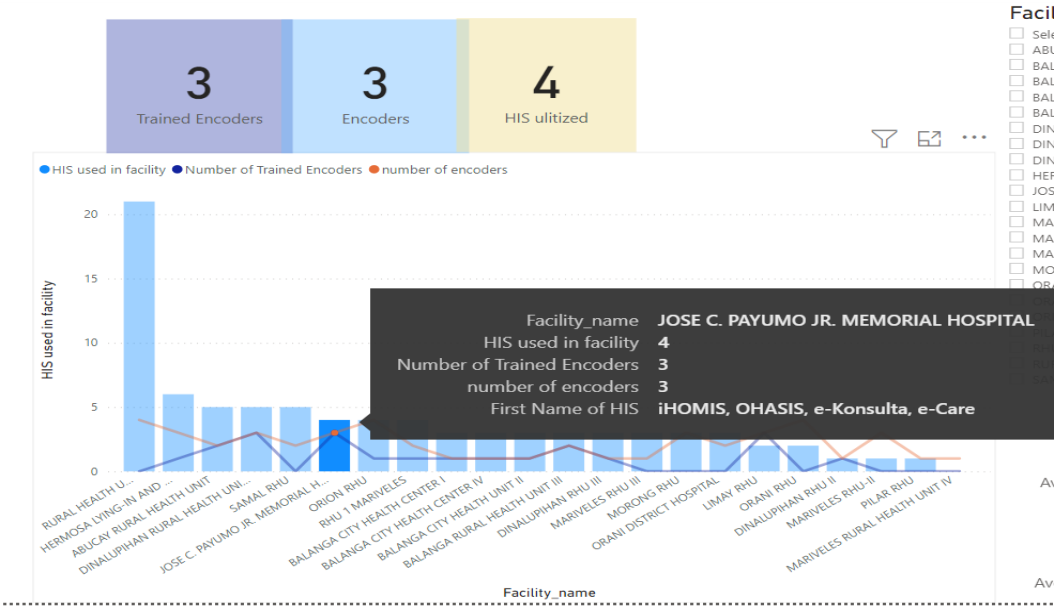

Figure 10. Jose C. Payumo Jr. Memorial Hospital

In this illustration, it shows the number of Health Information Systems (HIS) used in the Jose C. Payumo Jr. Memorial Hospital is 4, with 3 encoders and 3 trained encoders. The Health Information Systems used were iHomis, OHASIS, e-Konsulta and e-Care.

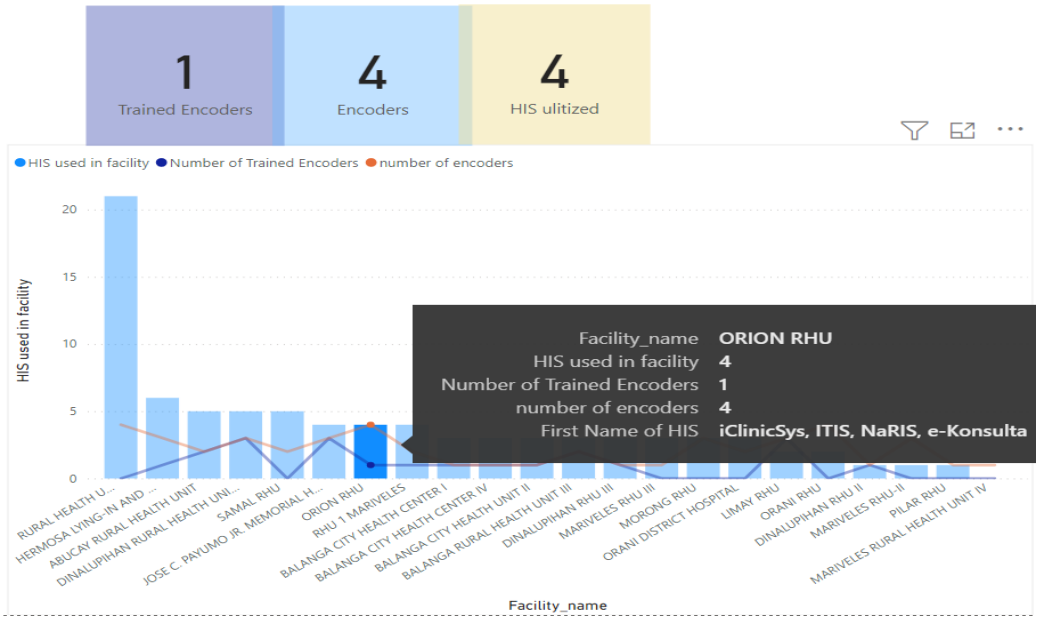

Figure 11. Orion Rural Health Unit

In this representation, it shows that the number of Health Information Systems (HIS) used in the Orion Rural Health Unit is 4, with 4 encoders and 1 trained encoder. The Health Information Systems used were iClinicSys, ITIS, NaRIS and e-Konsulta.

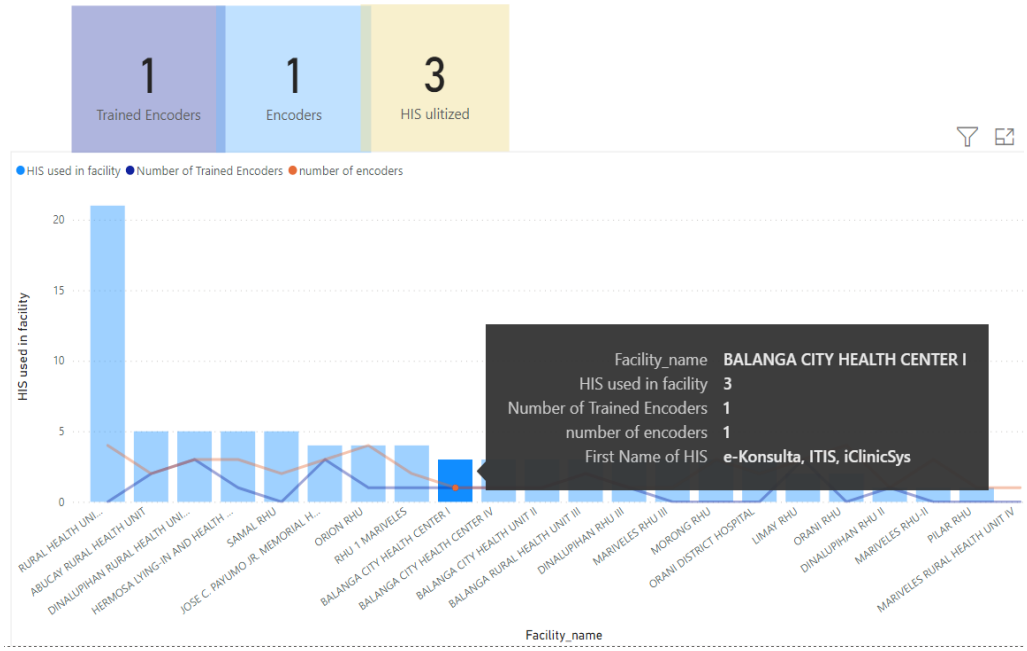

Figure 12. Balanga City Health Center 1

In this figure, it shows that the number of Health Information Systems (HIS) used in the Balanga City Health Center I is 3, with 1 encoder and 1 trained encoder. The Health Information Systems used were e-Konsulta, ITIS and iClinicSys.

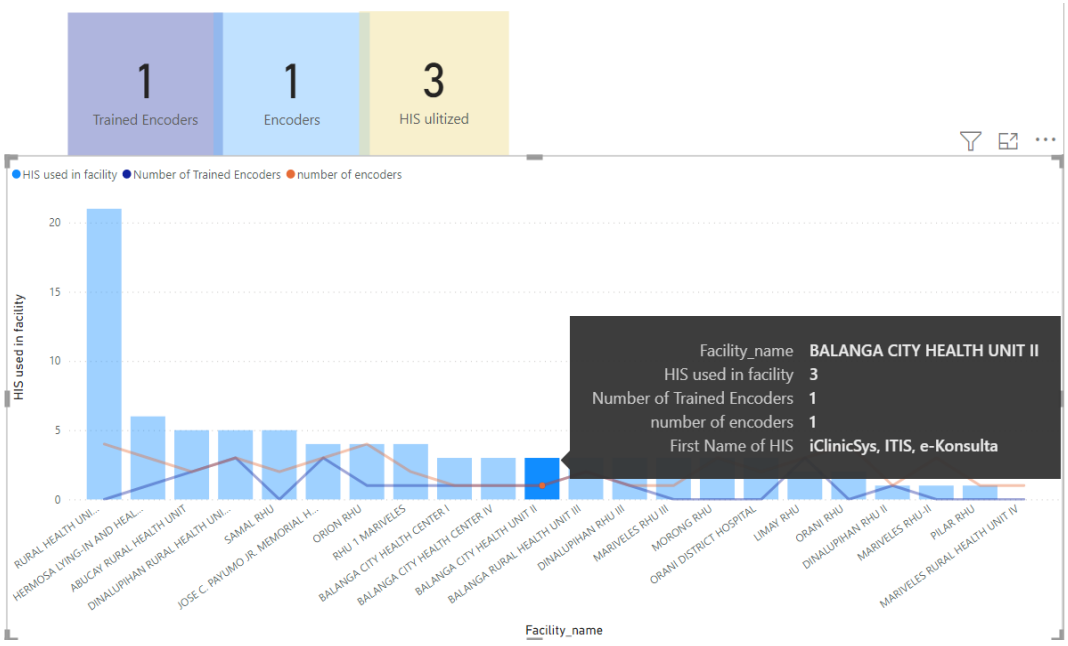

Figure 13. Balanga City Health Unit II

In this graph, it shows that the number of Health Information Systems (HIS) used in the Balanga City Health Unit II is 3, with 1 encoder and 1 trained encoder. The Health Information Systems used were iClinicSys, ITIS, and e-Konsulta.

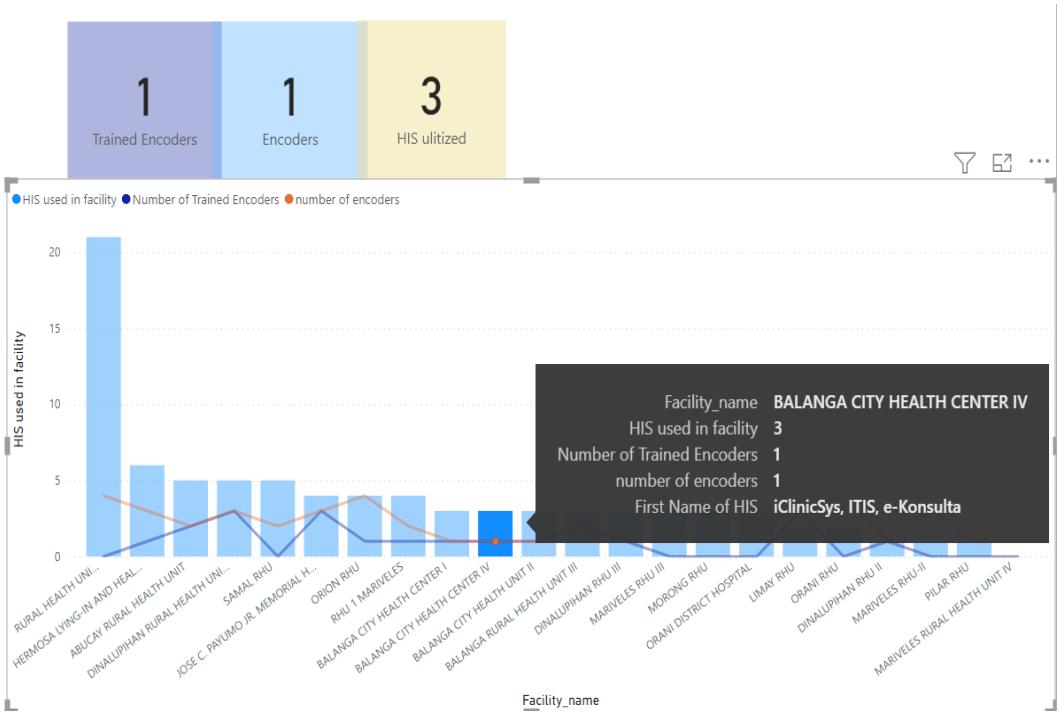

Figure 14. Balanga City Health Center IV

In this diagram, it shows that the number of Health Information Systems (HIS) used in the Balanga City Health Center IV is 3, with 1 encoder and 1 trained encoder. The Health Information Systems used were iClinicSys, ITIS, and e-Konsulta.

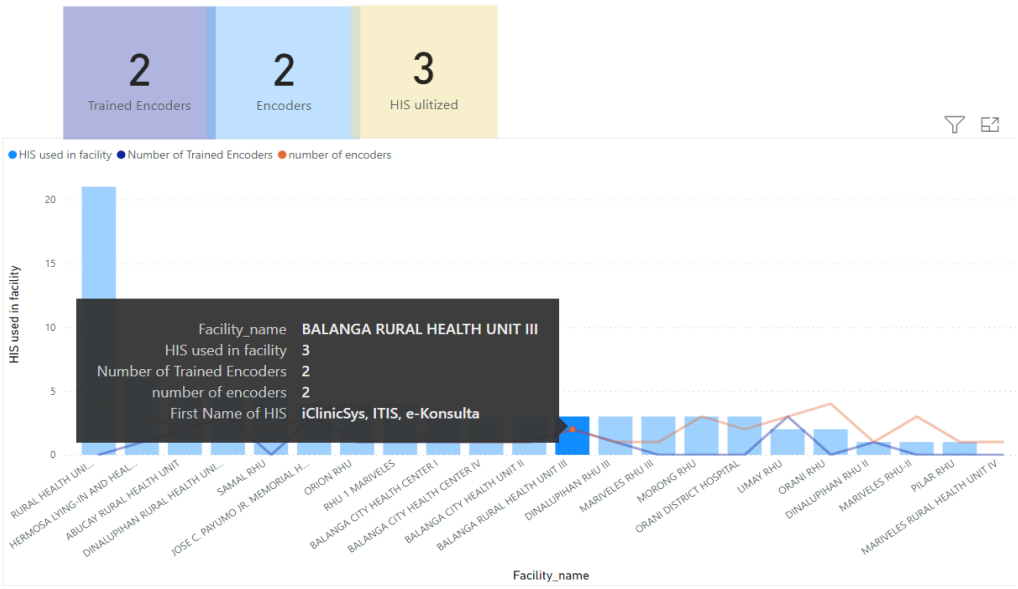

Figure 15. Balanga Rural Health Unit III

In this illustration, it shows that the number of Health Information Systems (HIS) used in the Balanga Rural Health Unit III is 3, with 2 encoders and 2 trained encoders. The Health Information Systems used were iClinicSys, ITIS, and e-Konsulta.

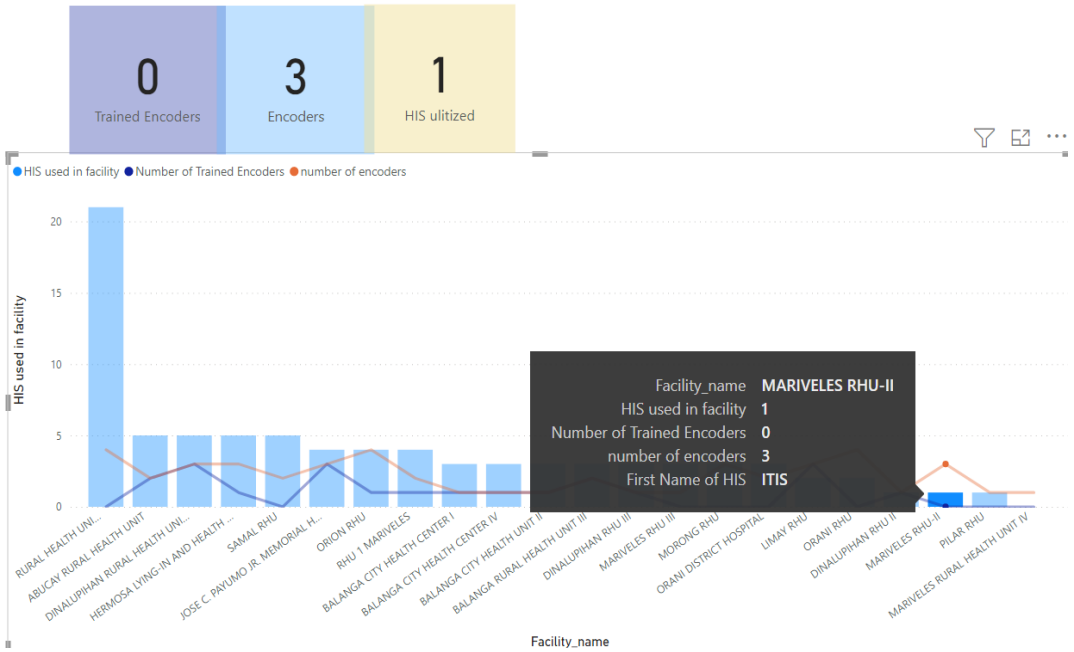

Figure 16. Mariveles Rural Health Unit II

In this representation, it shows that the number of Health Information Systems (HIS) used in the Mariveles Rural Health Unit II is 1, with 3 encoders and 0 trained encoders. The Health Information Systems used is ITIS.

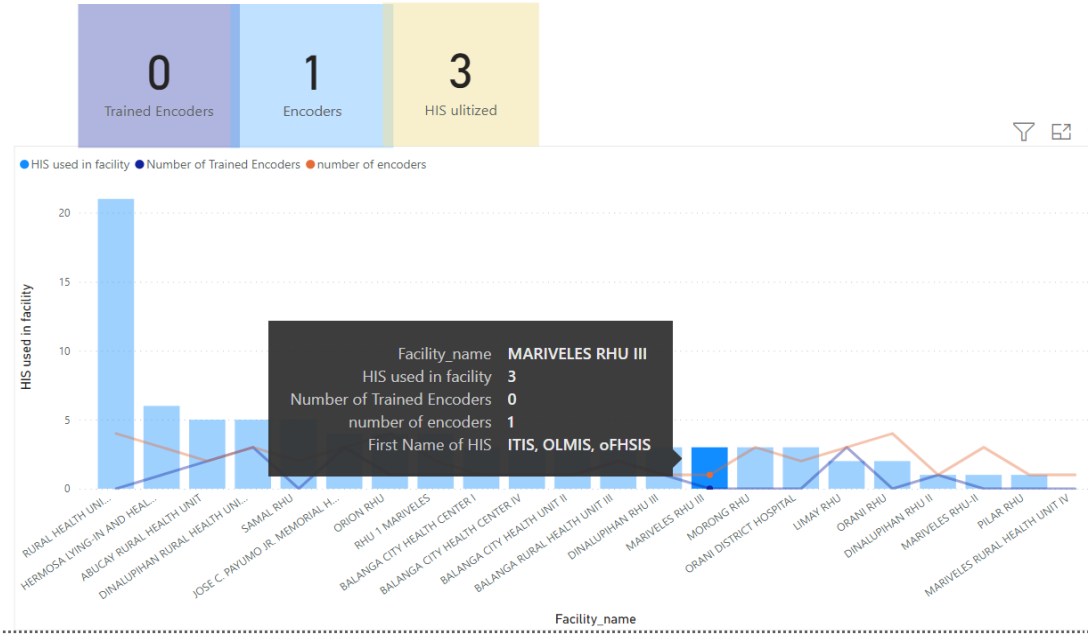

Figure 17. Mariveles Rural Health Unit III

In this figure, it shows that the number of Health Information Systems (HIS) used in the Mariveles Rural Health Unit III is 3, with 1 encoder and 0 trained encoders. The Health Information Systems used were ITIS, OLMIS and ofHSIS.

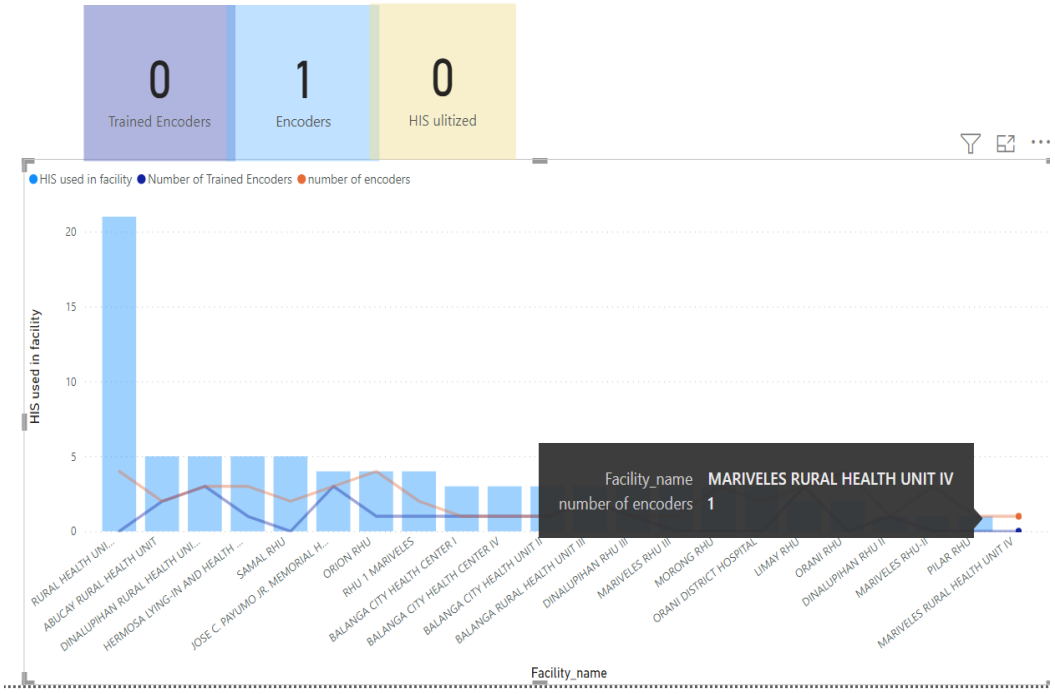

Figure 18. Mariveles Rural Health Unit IV

In this graph, it shows that the number of Health Information Systems (HIS) used in the Mariveles Rural Health Unit IV is 0, with 1 encoder and 0 trained encoders.

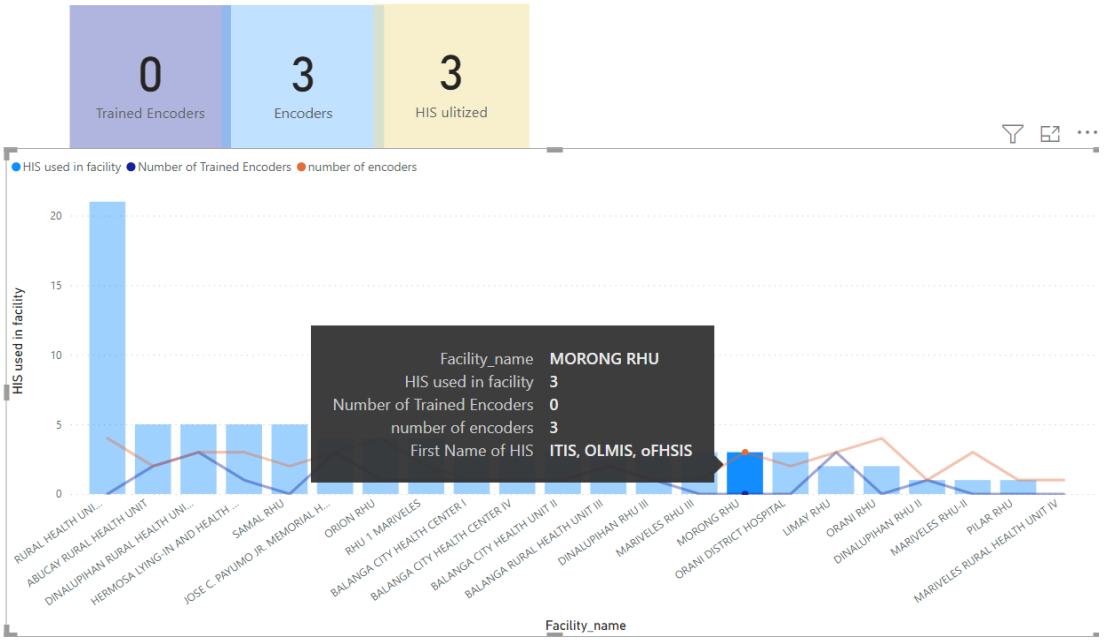

Figure 19. Morong Rural Health Unit

In this diagram, it shows that the number of Health Information Systems (HIS) used in the Morong Rural Health Unit is 3, with 3 encoders and 0 trained encoders. The Health Information Systems used were ITIS, OLMIS and ofHSIS.

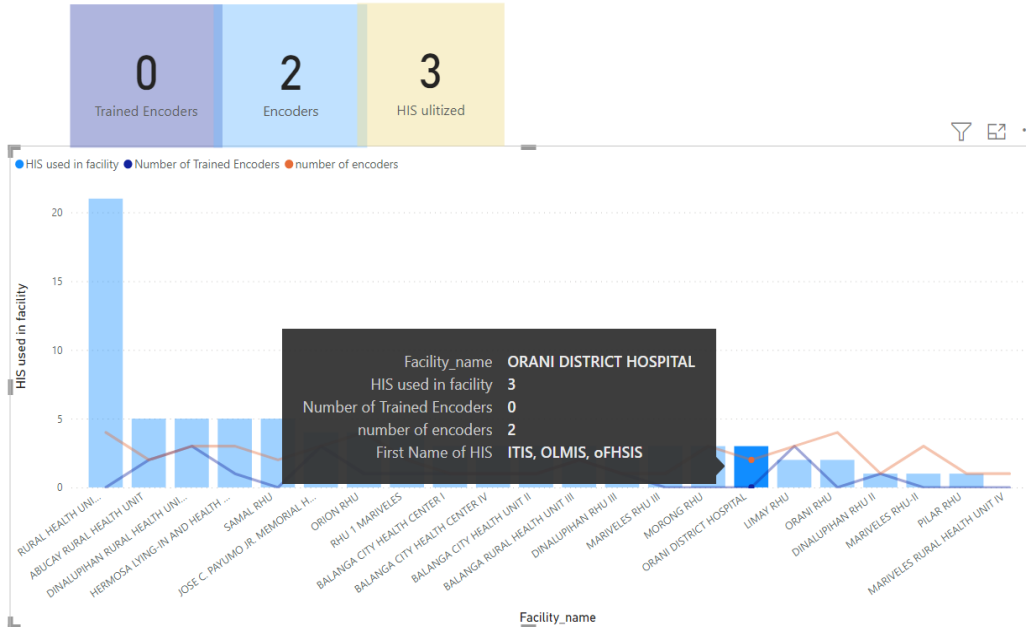

Figure 20. Orani District Hospital

In this illustration, it shows that the number of Health Information Systems (HIS) used in the Orani District Hospital is 3, with 2 encoders and 0 trained encoders. The Health Information Systems used were ITIS, OLMIS and ofHSIS.

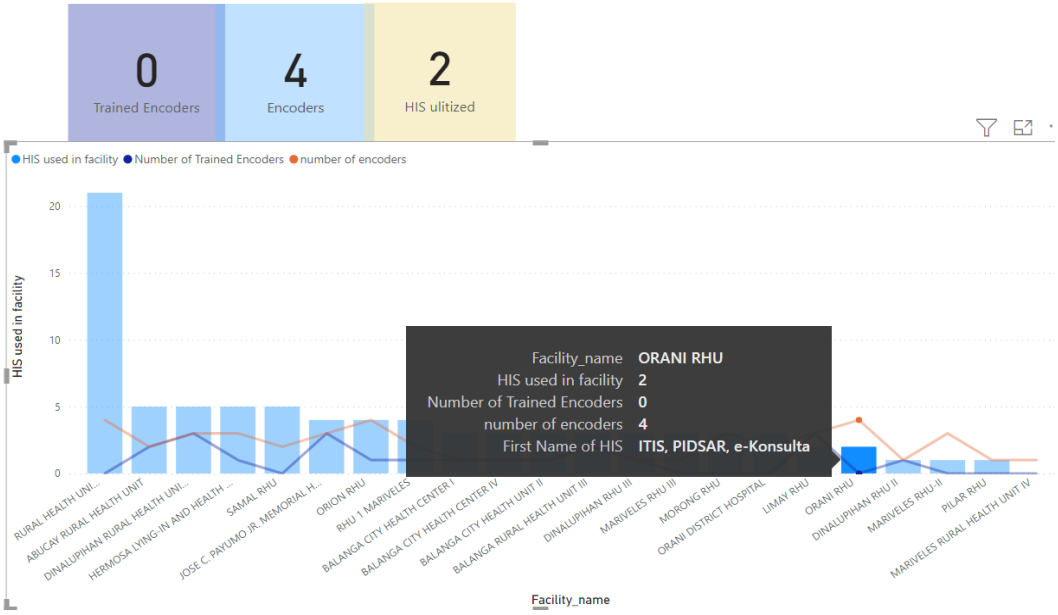

Figure 21. Orani Rural Health Unit

In this representation, it shows that the number of Health Information Systems (HIS) used in the Orani Rural Health Unit is 2, with 4 encoders and 0 trained encoders. The Health Information Systems used were ITIS, PIDSAR and e-Konsulta.

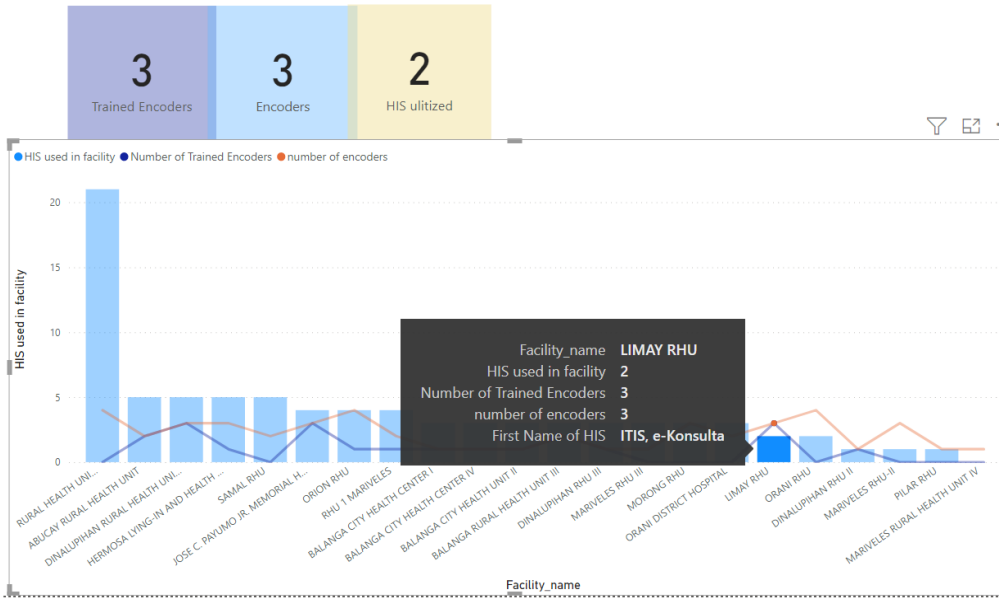

Figure 22. Limay Rural Health Unit

In this figure, it shows that the number of Health Information Systems (HIS) used in the Limay Rural Health Unit is 2, with 3 encoders and 3 trained encoders. The Health Information Systems used were ITIS and e-Konsulta.

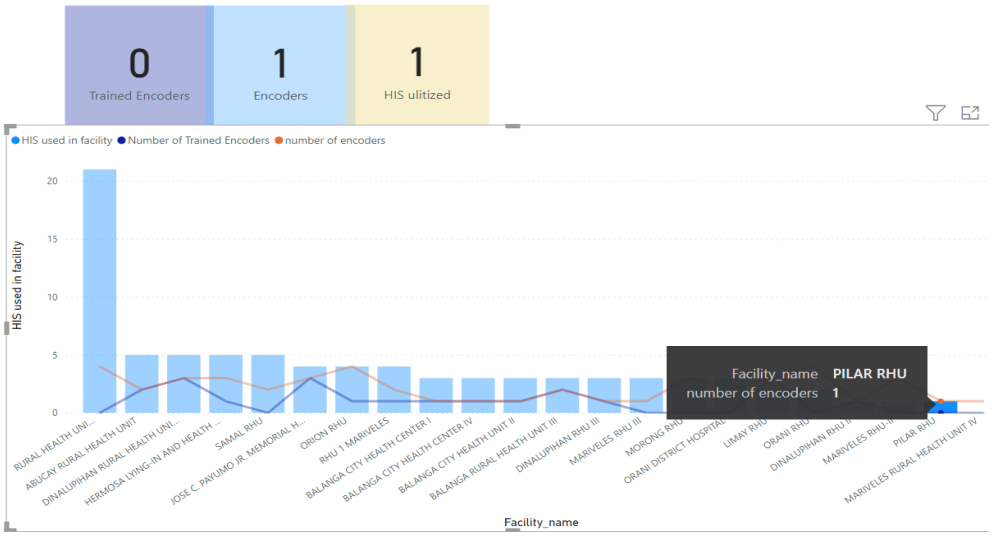

Figure 23. Pilar Rural Health Unit

In this graph, it shows that the number of Health Information Systems (HIS) used in the Pilar Rural Health Unit II is 1, with 1 encoder and 0 trained encoders.

3. What dashboard we may propose for visualizing the capacity and current status of the health information system?

In figures 2 - 23 the researchers used Microsoft Power BI to visualize the current status of the public healthcare facilities in the Province of Bataan.

Microsoft Power BI has interactive visualizations, with industry-leading data query and modeling built-in that helps to empower the researcher's analysis with timely critical insights.

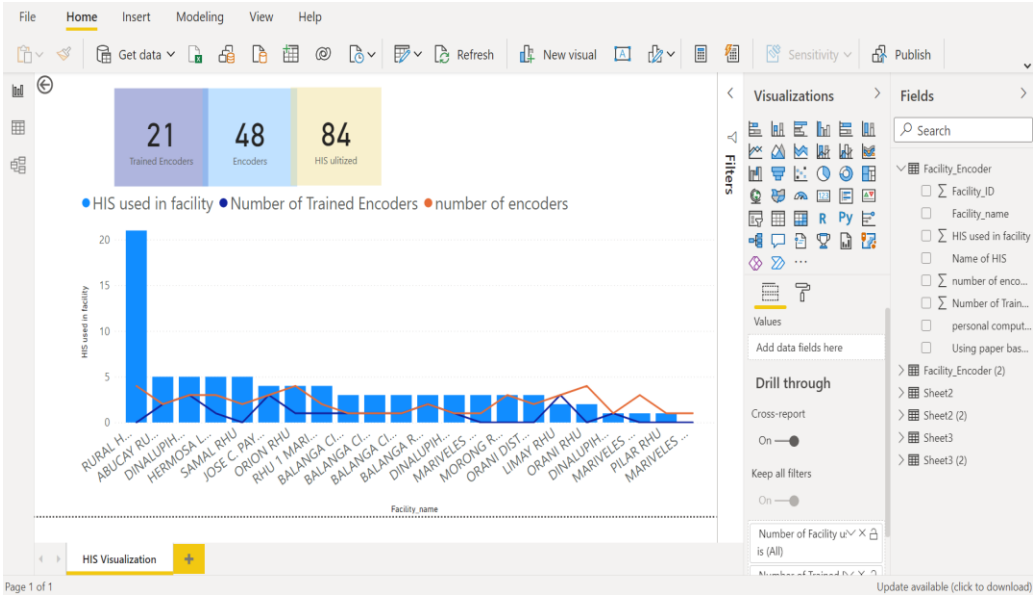

Figure 24. Microsoft Power BI dashboarding Platform

4. What capability training will be proposed based on the result of the study?

In reference to the data of trained and untrained encoders of the HIS in the public healthcare facilities in the Province of Bataan. The researchers proposed to train the encoders based on what HIS they are using in their facilities.

Summary of Findings, Conclusion, and Recommendation

Summary of Findings

The study focused on the type of reporting used for the health information systems (HIS) utilized in public health facilities in the Province of Bataan as well as the number of trained and untrained encoders.

The following are the significant findings of the study:

1. All of the public health facilities in the Province of Bataan are using the health information system (HIS) for health data collection and reporting to the Department of Health Center for Health Development (CHD).
2. Majority of the public health facilities are using HIS for data collection and reporting. Less than half of the public health facilities utilise the paper-based modality. In addition, a number of public health facilities are using both paper-based and HIS for data collection and reporting.
3. Every public health facility has trained encoders for the health information
4. system (HIS) they are using but the majority of encoders are not trained..

The researchers used Microsoft Power BI to develop a dashboard to visualize the current situation of public health facilities in the Province of Bataan.

Conclusion

In this section of the study the researchers provide conclusions based on the visualized analysis of the study. Accordingly the researchers had the following conclusions:

1. The Province of Bataan is capable of the integration of health information systems.
2. The Province of Bataan is supporting the implementation of the use of HIS by designating encoders in every public health facility.
3. The majority of the encoders in the Province of Bataan will be trained to use the HIS in their respective public health facilities to enhance the quality of their work.
4. The Department of Health Center for Health Development (CHD) has timely access to the health data records in the majority of healthcare facilities in the Province of Bataan through HIS.

Recommendation

In accordance on the conclusions and result of the study, the researchers recommend the following:

For the Public Health Facilities:

The public healthcare facilities in the Province of Bataan should collect and report their data exclusively through a health information system to increase efficiency in the respective facilities and devote their time in the service of the people's health needs.

For the Department of Health:

1. The Department of Health should determine the HIS that are underutilized in the public healthcare facilities. This will help the department in focusing the utilization of funds for the HIS that are actually used in public healthcare facilities.
2. The Department of Health should provide proper training for the encoders of the HIS being rolled out in the public healthcare facilities.

For the future researchers:

For the improvement of the overall healthcare delivery system in the Philippines, this study will serve as an inspiration in conducting future investigations about Health Information Systems (HIS).

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